

TABLE 3.—Maximum free-air wind velocities (M. P. S.), for different sections of the United States, based on pilot-balloon observations during May 1943

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast ¹	39.1	w.	1,570	7	Philipsburg, Pa.	46.0	w.	4,780	14	Boston, Mass.	75.2	wnw.	8,120	10	Caribou, Maine.
East-Central ²	37.1	ssw.	1,290	11	Knoxville, Tenn.	44.0	w.	5,000	3	Huntington, W. Va.	56.6	nw.	9,460	1	Huntington, W. Va.
Southeast ³	26.3	ssw.	1,010	11	Charleston, S. C.	27.2	sw.	4,600	25	Jacksonville, Fla.	50.0	w.	13,990	1	Miami, Fla.
North-Central ⁴	39.2	swsw.	2,500	16	Detroit, Mich.	45.2	w.	4,780	13	Alpena, Mich.	55.0	nnw.	8,680	4	Sault Ste. Marie, Mich.
Central ⁵	43.2	swsw.	1,960	2	Wichita, Kans.	47.5	sw.	3,200	5	St. Louis, Mo.	47.2	w.	13,210	11	Wichita, Kans.
South-Central ⁶	37.0	s.	2,000	5	Texarkana, Ark.	39.2	n.	3,440	25	Texarkana, Ark.	67.5	w.	12,000	11	Oklahoma City, Okla.
Northwest ⁷	37.4	w.	1,340	4	Great Falls, Mont.	41.0	w.	3,910	22	Great Falls, Mont.	64.4	nnw.	9,310	8	Great Falls, Mont.
West-Central ⁸	27.3	nne.	2,500	8	Redding, Calif.	41.5	nw.	4,620	7	Winnemucca, Nev.	68.0	w.	6,800	15	Modena, Utah.
Southwest ⁹	27.8	w.	2,280	15	Roswell, N. Mex.	38.5	w.	4,910	7	Raton, N. Mex.	68.0	wnw.	11,340	6	Reno, Nev.
											68.0	wsww.	9,670	17	Winslow, Ariz.

¹ Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and Northern Ohio.

² Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, Eastern Tennessee, and North Carolina.

³ South Carolina, Georgia, Florida, and Alabama.

⁴ Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.

⁵ Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.

⁶ Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and Western Tennessee.

⁷ Montana, Idaho, Washington, and Oregon.

⁸ Wyoming, Colorado, Utah, Northern Nevada, and Northern California.

⁹ Southern California, Southern Nevada, Arizona, New Mexico, and extreme West Texas.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

Excessive flooding extended over seven States from Oklahoma northeastward to southern Michigan during May, causing great damage in the extensive agricultural and industrial areas of this region. This may be ranked as the most outstanding flood event since the great flood in the Ohio Valley of January-February 1937. Although direct loss of life was relatively small, property and crop damage was especially disastrous.

The floods were caused by unprecedented rains which occurred in most areas, in two general storm periods, the first from May 6 to 11, and the second, May 14 to 20. These storms produced record rainfall for May in the States of Indiana, Illinois, Missouri, and Oklahoma, in which more than twice the normal amount of rain fell.

Elsewhere precipitation during May was generally above normal from the Rocky Mountains eastward except in Louisiana, Mississippi, Alabama, the Carolinas, South Dakota, and Nebraska. The far western States had below-normal precipitation, the far Southwest having less than half the normal amount.

Floods in Central States.—The extensive, and in many cases record-breaking, floods covered the following States: eastern Oklahoma, southeastern Kansas, Missouri, Arkansas, Illinois, Indiana, and southern Michigan. The Neosho (Grand), Illinois, Verdigris, Walnut, Cimarron, and Poteau Rivers, and the Arkansas River from Tulsa, Okla., to the mouth, in the Arkansas Basin; the White River Basin in Arkansas and Missouri; the Osage, Grand, and Gasconade Rivers, and the Missouri River from Jefferson City, Mo., to the mouth, in the Missouri Basin; the Illinois, Kaskaskia, and Meramec Rivers, and the Mississippi River from Grafton, Ill., to New Madrid, Mo., in the upper Mississippi Basin; the entire Wabash River system except the East Fork of the White, and the Maumee River Basin, were the principal rivers affected.

Relatively short-time stage records were exceeded at many places and, as shown in the accompanying table, long-time records were broken at several places along the

Illinois River, the Osage River in Missouri, portions of the Wabash River, the Arkansas River from Muskogee, Okla., to Dardanelle, Ark., and tributaries of the Arkansas in Kansas and Oklahoma. Records which have stood since 1833 were broken in the Arkansas River, the stage at Fort Smith, Ark., reaching a peak of 41.7 feet in the first rise on May 23, against a stage of 38.0 feet in 1833. In the Osage River, the great flood of 1844 was exceeded by about 9 feet at Tuscumbia, Mo., and by about 4 feet at St. Thomas, Mo. At St. Louis, Mo., the Mississippi reached a stage of 38.9 feet on May 24, just 2.5 feet below the maximum stage of 1844.

At the beginning of the month river stages were considerably below normal in all of the flood area except that stages in the Missouri and upper Mississippi Rivers were still moderately high from the snow-smelt run-off in April. Thus, conditions were relatively favorable for the retention of water in the basins.

The effective rains began on May 6, when amounts up to more than 5 inches occurred in the Verdigris and Neosho Rivers in Kansas. The precipitation then spread rapidly northeastward to Indiana and southern Michigan and southward into eastern Oklahoma and northern Arkansas. Heavy rains continued until the 12th, when there was a respite from rain in the flood area for several days. Rains began again on May 14, and continued heavy over the same areas until May 20. More scattered rains extended through the remainder of the month but were not particularly effective as far as the floods were concerned.

The meteorological conditions associated with the floods were characterized by the presence of a warm, moist anticyclone centered off the South Atlantic coast, and a cold, dry anticyclone occupying all of the northwestern third of the country.

The region (or trough) of low pressure between the two high-pressure cells, continued to occupy the same general area extending from Texas northeastward to the eastern Great Lakes, throughout the period from early May to the 21st of the month. A stationary front, in the trough of low pressure persisted and minor waves along the front produced a succession of 12- to 24-hour periods of heavy rainfall in areas extending from Oklahoma and Arkansas to southern Michigan.

A more complete report of these floods will be given in a later issue of the REVIEW.

SUMMARY OF CREST STAGES FOR FLOODS OF MAY 1943

River and station	Flood stage	Highest known flood		Crest(s) during May 1943	
		Stage	Year	Stage	Date
Maumee:					
Fort Wayne, Ind.....	15	26.1	1913	{19.7 22.2	13 19
Illinois:					
Morris, Ill.....	13	26.85	1866	21.6	21
Peru, Ill.....	17	27.0	1916	28.0	22
Peoria, Ill.....	18	26.3	1844	28.6	23
Havana, Ill.....	14	23.5	1926	27.3	25
Beardstown, Ill.....	14	26.25	1926	29.7	26-27
Meramec River:					
Sullivan, Mo.....	11	33.0	1915	20.1	20
Pacific, Mo.....	11	30.8	1915	22.0	21
Valley Park, Mo.....	14	37.85	1915	{22.8 26.2	13 22
Grand River:					
Gallatin, Mo.....	20	39.3	1909	23.6	17
Chillicothe, Mo.....	18	33.65	1909	28.4	18
Brunswick, Mo.....	12	23.0	1909	15.5	20-21
Osage River:					
Quenemo, Kans.....	27	38.4	1928	{18.8 31.2	16 19
Ottawa, Kans.....	24	37.6	1928	{14.2 26.1	16 19
La Cygne, Kans.....	25	30.8	1925	30.1	21
Trading Post, Kans.....	24	34.45	1929	27.8	19
Osceola, Mo.....	20	45.3	1844	41.5	20
Lakeside (Bagnell Dam), Mo.....	60	62.3	1941	{62.3 65.4	13-14 22
Osage:					
Tuscumbia, Mo.....		39.6	1844	{29.8 48.5	13 20
St. Thomas, Mo.....	23	39.4	1844	{27.5 43.7	13 20
Gasconade:					
Jerome, Mo.....	15	29.0	1897	24.4	21
Missouri:					
Boonville, Mo.....	21	32.69	1844	23.5	20
Jefferson City, Mo.....		33.5	1903	27.8	21
Hermann, Mo.....	21	35.7	1844	{21.2 30.9	12 22
St. Charles, Mo.....	25	40.11	1844	{26.3 36.6	13 22
Wabash:					
Bluffton, Ind.....	10	20.0	1913	14.7	19
Logansport, Ind.....	17	25.3	1913	21.4	19
La Fayette, Ind.....	11	32.9	1913	28.4	19
Covington, Ind.....	16	35.1	1913	32.4	20
Terre Haute, Ind.....	14	31.3	1913	30.5	20
Vincennes, Ind.....	14	25.2	1930	27.0	22
Mt. Carmel, Ill.....	17	31.0	1913	27.5	25
New Harmony, Ind.....	15	27.2	1913	23.8	26
White:					
Cotter, Ark.....	21	42.5	1927	{39.7 28.5	12 21
Calico Rock, Ark.....	19	51.9	1916	{46.8 29.6	11 21
Batesville, Ark.....	23	43.4	1916	{39.9 32.0	13 22
Newport, Ark.....	26	35.6	1927	{34.5 31.0	15 23-24
Georgetown, Ark.....	21	31.3	1935	{31.4 29.3	18 26
Clarendon, Ark.....	26	43.3	1927	33.2	30-June 1
Walnut:					
Winfield, Kans.....	23	40.6	1928	39.7	19
Cimarron:					
Perkins, Okla.....	11	14.6	1932	14.4	20
Verdigris:					
Independence, Kans.....	36	46.7	1904	{47.6 27.4	20 26
Claremore, Okla.....		46.6	1941	{46.6 55.0	14 22
Burlington, Kans.....	23	34.4	1928	23.0	19-20
Iola, Kans.....	15	22.1	1926	20.7	19
Chanute, Kans.....	20	28.3	1928	28.9	19
Parsons, Kans.....	22	27.5	1928	{21.2 29.25	11 20
Oswego, Kans.....	17	25.4	1927	{22.1 25.8	11 21
Poteau:					
Poteau, Okla.....	21			{37.0 26.6	12 22
Arkansas:					
Tulsa, Okla.....	12	19.8	1923	{10.4 16.7	10 20
Muskogee, Okla.....		37.2	1941	{34.5 48.4	11 21
Webbers Falls, Okla.....	23	38.2	1833	{38.5 40.4	11 22
Fort Smith, Ark.....	22	38.0	1833	{41.7 38.8	12 23
Van Buren, Ark.....	22	35.8	1941	{38.1 37.0	12 23
Ozark, Ark.....	22	36.2	1927	{38.4 38.4	14 24
Dardanelle, Ark.....	22	33.0	1927	{33.8 34.0	14 25

SUMMARY OF CREST STAGES FOR FLOODS OF MAY 1943—Continued

River and station	Flood stage	Highest known flood		Crest(s) during May 1943	
		Stage	Year	Stage	Date
Arkansas—Continued.					
Morrilton, Ark.....	20	32.0	1927	{30.8 30.5	15 26
Little Rock, Ark.....	23	34.6	1833	{28.4 30.0	17 27-28
Pine Bluff, Ark.....	25	33.0	1935	{32.8 33.8	17 28
Mississippi:					
St. Louis, Mo.....	30	41.4	1844	{26.5 38.9	14 24
Chester, Ill.....	27	39.7	1844	{38.0 31.4	25 15
Cape Girardeau, Mo.....	32	42.5	1844	{42.4 41.3	27 31
New Madrid, Mo.....	34	47.9	1937	53.0	30
Cairo, Ill. (Ohio).....	40	59.5	1937		

† Estimated.

Upper Mississippi Basin.—Locally excessive rains of the thunderstorm type occurred in Monroe, Trempealeau, and Jackson Counties in Wisconsin from May 28 to 31. Previous general light showers from May 23 to 26 had saturated the ground. Flash floods resulted in the smaller tributary streams of the upper Black and Trempealeau Rivers. By far the most damaging flood occurred in the Beaver Creek area, a small tributary of the La Crosse River, draining an area of approximately 18 square miles. The creek runs directly through the business section of Sparta, Wis., where an enormous amount of damage occurred. One life was reported lost and property damage in Sparta has been estimated at more than a quarter of a million dollars. The total losses from the storm and the flood including La Crosse, Monroe, Trempealeau, Eau Claire, Chippewa, Jackson, and Buffalo counties are estimated at \$400,000.

The flood producing rain appears to have begun about 8:25 p. m. of the 29th lasting until 2:10 a. m. of the 30th. The rainfall for the last 3 days of May at Sparta, Wis., was 2.70 inches; at Hatfield, Wis., 4.91 inches; at Blair, Wis., 2.60 inches; West Salem, Wis., 1.02 inches; and Neillsville, Wis., 4.35 inches. There are no authentic records of rainfall directly above Sparta in Beaver Creek but the fall must have exceeded 4 inches in a 2-hour period to produce the volume of run-off.

Ohio Basin.—On May 25-26 a flash flood occurred in the headwaters of the Clarion River, a tributary of the Allegheny River, which caused damage estimated at \$75,000. Official records of rainfall show slightly over 2 inches over practically all of the upper Clarion Basin. Over a rather concentrated area between the east and west branches of the Clarion, in the northern portion of Elk County, Pa., unofficial measurements show 4 to 6.5 inches of rain during the afternoon and night of May 25.

Pacific Slope drainage.—Kings River at Piedra, Calif., was above flood stage on several days during the month as the result of melting snow at high levels. Waters in Lake Tulare in Kings County rose from rain in the mountains on May 4 and the run-off from melting snow causing flooding of reclaimed farm lands.

Additional information furnished by the Los Angeles County Flood Control District, relative to the heavy rainfall in southern California reported in the January issue of the REVIEW, indicates a record 24-hour rainfall recorded at one of their stations. At Camp LeRoy (formerly Hoegge's Camp) in Santa Anita Canyon near Arcadia, the total storm rainfall of 37.34 inches in 60 hours on January 21-23, and the maximum 24-hour rainfall of 25.83 inches exceeded all previous records in this region, and the 24-hour amount is greater than any previously recorded in the United States.